

CLAIMS:

1. A process of enzymatic saccharification or pre-saccharification, wherein liquefied starch-containing material is treated with glucoamylase activity at a pH from 5.5 to 6.2 and at
5 a temperature of 50 to 80°C for 0.5 to 36 hours.
2. The process of claim 1, wherein the saccharification is carried out at a pH between above 5.5 and 6.2, preferably between pH 5.6 and 6.0, especially about pH 5.7.
- 10 3. The process of claims 1 or 2, wherein the saccharification is carried out at temperature between 60 and 70°C.
4. The process of claims 1 to 3, wherein the saccharification is carried out for between 0.5 and 24 hours, such as 1 to 16 hours, such as 1 to 8 hours.
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5. The process of claims 1 to 4, wherein liquefied starch material is prepared by dry milling for between 1 and 16 hours, preferably 1 to 8 hours.
6. The process of claims 1 to 4, wherein liquefied starch material is prepared by wet
20 milling for between 5 and 30 hours, preferably 8 to 16 hours.
7. The process of any of the preceding claims, wherein the starch-containing material is prepared from whole grains, preferably corn, milo or barley.
- 25 8. The process of any of the preceding claims, wherein the saccharification or pre-saccharification step is followed by a fermentation step.
9. The process of claim 8, wherein the fermentation is carried out by yeast, preferably a *Saccharomyces*, especially *S. cerevisiae*.
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10. The process of any of the preceding claims, wherein the starch-containing material to be saccharified is liquefied using an alpha-amylase, preferably a fungal or a bacterial alpha-amylase.
- 35 11. The process of any of the preceding claims, wherein the glucoamylase is derived from a fungal organism, in particular a strain of the filamentous fungus genus *Aspergillus* or *Talaromyces*, in particular a strain of *A. niger* or *T. emersonii*.

12. The process of any of the preceding claims, wherein the glucoamylase is added in an amount of 0.01 to 0.6 AGU/ g DS, preferably between 0.1 to 0.3 AGU/g DS.

13. The process of any of the preceding claims, wherein the saccharification is carried out in the presence of an acid alpha-amylase, preferably an acid fungal alpha-amylase, preferably in an amount of from 0.1 to 0.3 AFAU/ g DS, preferably around 0.2 AFAU/g DS.

14. The process of any of the preceding claims, wherein the saccharification is a pre-saccharification carried out for 0.5 to 8 hours.

15. A process of producing ethanol, comprising the steps of:

a) liquefying starch-containing material,

b) saccharifying the liquefied starch-containing material obtained in step a) with a glucoamylase at a pH in the range of 5.2 to 6.2 and at a temperature of 50 to 80°C for 1 to 36 hours.

c) fermenting the saccharified starch-containing material obtained in step b),

d) recovering ethanol from step c).

16. The process of claim 15, wherein the saccharification is carried out as defined in claims 1 to 14.

17. The process of claims 15 or 16, wherein the saccharification in step b) is carried out at a pH between 5.5 and 6.2, preferably between pH 5.6 and 6.0, especially about pH 5.7.

18. A process of producing ethanol, comprising the steps of:

a) liquefying starch-containing material,

b) pre-saccharifying the liquefied starch-containing material obtained in step a) with a glucoamylase at a pH in the range of 5.2 to 6.2 and at a temperature of 50 to 80°C for 0.5 to 8 hours.

c) fermenting and saccharifying the pre-saccharified starch-containing material obtained in step b),

d) recovering ethanol from step c).

19. The process of claim 18, wherein the pre-saccharification is carried out as defined in claims 1 to 14.

20. The process of any of claims 18 or 19, wherein the pre-saccharification in step b) is carried out at a pH between 5.5 and 6.2, preferably between pH 5.6 and 6.0, especially about pH 5.7.